WHAT IS CLAIMED IS:

1. An optical imaging apparatus having an optical scanning probe which irradiates low-coherence light onto a subject and performs photo-reception of the light scattered at the subject, and an observation device for constructing a cross-section image of the subject, based on information from the light received through said optical scanning probe, having said optical scanning probe detachably connected thereto, said optical imaging apparatus comprising:

an optical scanning probe comprising;

a sheath, the greater portion thereof being formed of a flexible resin tube with at least the tip thereof being formed of a material with good light transmittance, and the tip thereof not being opened;

housing provided to the base end of the sheath, and mounting/detaching means for mounting housing to said observation device;

a flexible pipe member provided rotatably within said sheath, around the longitudinal axis thereof;

a rotational force transmitting means provided to the base portion of said pipe member;

a rotation holding means for holding said rotational force transmitting means rotatably to said housing;

fiber comprised of single mode fiber provided

within said flexible pipe member, with the tip portion thereof being fixed to the tip of said pipe member, such that the light cast from a low-coherence light source is cast into the base end thereof;

a lens for converging light cast from said fiber provided to said fiber tip; and

a cast light path changing means fixed to said lens for changing the optical path of the cast light;

a fiber end fixing means provided to the base end of said fiber; and

an elastic means provided between said fiber end fixing means and said rotational force transmitting means;

and

an observation device, comprising;

a rotational driving device for providing rotational force to said rotational force transmitting member of said optical probe; and

an optical connecting means for connecting the fiber for sending and receiving observation light, provided to said single mode fiber of said optical probe of said observation device;

wherein, at the time of connecting said optical probe and said observation device by said mounting/detaching means, said fiber end fixing means come into close contact with said optical connecting means due to elastic means of said optical probe,

thereby performing optical connection.

2. An optical imaging apparatus according to Claim 1, wherein said elastic means comprises holding means for holding elastic members one to another.

3. An optical imaging apparatus according to Claim 1, wherein any of said fiber end fixing means, elastic means, and rotational force transmitting member has a gap enabling parallel movement of the mutual rotational axes, in the diameter direction of the rotational axes.

4. An optical imaging apparatus according to Claim 1, comprising a bearing between any of said fiber end fixing means, elastic means, and rotational force transmitting member, such that the mutual rotational axes rotate with an angle.

5. An optical imaging apparatus according to Claim 4, wherein said bearing is a spherical bearing.

6. An optical imaging apparatus according to Claim 4, wherein said bearing is comprise a tapered plane and a curved plane which meet.

7. An optical imaging apparatus according to Claim

1, further comprising a rotation restricting member for preventing rotational offset exceeding a certain amount for occurring relatively between said rotational force transmitting member and said fiber end fixing means.

8. An optical probe and an observation device of an optical imaging apparatus for irradiating low-coherence light onto a subject and constructing a cross-section image of a subject, based on information from the light scattered at the subject, said optical imaging apparatus comprising:

an optical probe comprising;

a sheath, the greater portion thereof being formed of a flexible resin tube with at least the tip thereof being formed of a material with good light transmittance, and the tip thereof not being opened;

housing provided to the base end of the sheath, and housing mounting/detaching means for mounting housing to said observation device;

a flexible pipe member provided rotatably within said sheath, around the longitudinal axis thereof;

fiber comprised of single mode fiber provided within said flexible pipe member, with the base portion and tip portion thereof being fixed to the base and tip of said pipe member, such that the light cast from a low-coherence light source is cast into the base end thereof;

a lens for converging light cast from said fiber provided to said fiber tip;

a cast light path changing means fixed to said lens for changing the optical path of the cast light;

a fiber end fixing means provided to the base end portion of said pipe member for fixing the fiber base portion; and

a rotation holding means for holding said fiber end fixing means rotatably to said housing;

and

an observation device, comprising;

a rotational driving device for providing rotational force to said pipe member of said optical probe; and

an optical connecting means for connecting the fiber for sending and receiving observation light, provided to said single mode fiber of said optical probe of said observation device;

wherein, means for mounting/detaching said fiber to said optical connecting means is provided to said fiber end fixing means of said optical probe, and said rotational driving device of said observation device rotates said optical connecting means.

9. An optical imaging apparatus according to Claim 8, wherein said housing mounting/detaching means connects to

said observation device, in such a state that the housing is movable in the direction of the rotational axis of said fiber end fixing means.

10. An optical imaging apparatus for irradiating low-coherence light onto a subject and constructing a cross-section image of a subject, based on information from the light scattered at the subject, said optical imaging apparatus comprising:

an optical probe comprising;

single mode fiber for irradiating low-coherence light onto a subject and performing photo-reception of the light scattered at the subject; and

an optical element for irradiating light from said fiber provided to the tip portion of said optical probe onto an organism and performing photo-reception thereof;

an observation device comprising;

a first single mode fiber provided at the object light side of the fiber interferometer;

a second single mode fiber optically connected detachably to said first single mode fiber; and

an optical connecting means for connecting said second single mode fiber to the single mode fiber of said optical probe;

and

a mounting/detaching means for attaching said optical probe to said observation device.

11. An optical imaging apparatus for irradiating low-coherence light onto a subject and constructing a cross-section image of a subject, based on information from the light scattered at the subject, said optical imaging apparatus comprising:

an optical probe comprising;

a sheath, the greater portion thereof being formed of a flexible resin tube with at least the tip thereof being formed of a material with good light transmittance, and the tip thereof not being opened;

housing provided to the base end of the sheath, and housing mounting/detaching means for mounting housing to said observation device;

a flexible pipe member provided rotatably within said sheath, around the longitudinal axis thereof;

fiber comprised of single mode fiber provided within said flexible pipe member, with the base portion and tip portion thereof being fixed to the base and tip of said pipe member, such that the light cast from a low-coherence light source is cast into the base end thereof;

a lens for converging light cast from said fiber provided to said fiber tip; and

a cast light path changing means fixed to said lens for changing the optical path of the cast light;

and

an observation device, comprising;

a first single mode fiber provided at the object light side of the fiber interferometer;

a rotating means for providing rotational force to said pipe portion;

a second single mode fiber provided in the hollow of said rotating means so as to integrally rotate with said rotating means;

a rotating optical joint for connecting the fixed first single mode fiber and the rotating second single mode fiber;

a third single mode fiber optically connected in a detachable manner to said second single mode fiber, so as to integrally rotate with said rotating means; and

an optical connecting means for connecting said third single mode fiber to the single mode fiber of said optical probe.

12. An optical imaging apparatus, comprising:

an optical scanning probe, comprising at least:

a sheath with at least the tip thereof being formed of a material with good light transmittance;

a mounting means covered by a connector case

provided at the base of the said sheath;

a pipe member provided within said sheath so as to be rotatable around the axis in the longitudinal direction;

a rotational force transmitting member provided at the base portion of said pipe member;

a rotational holding means for rotatably holding said rotational force transmitting member within said connector case;

a first light guiding member provided within said pipe member, such that light emitted from the low-coherence light source is cast into the base portion thereof;

an optical scanning direction changing means provided at the tip portion of said first light guiding member, for emitting low-coherence light to the subject side, and also performing photo-reception of scattered light from the subject and guiding this light to the base portion side of said first light guiding member;

a base portion fixing means provided at the base portion of said first light guiding member; and

elastic means provided between said base portion fixing means and said rotational force transmitting member, for pressing said base portion fixing means against the base side thereof in an elastic manner;

and

an observation device, comprising:

an low-coherence light source for generating said low-coherence light;

optical connecting means to which said mounting means is detachably connected, for emitting the low-coherence light guided from said low-coherence light source to the base portion of said first light guiding member, and also connecting the end portion of a second light guiding member such that scattered light from said subject is cast in; and

a rotational driving device for applying rotational force to said rotational force transmitting member in the state that said mounting means is connected;

wherein, in the state that the base portion of said optical scanning probe is mounted to said observation device by said mounting means, said elastic means presses said base portion fixing means against said optical connecting means, thereby performing optical connection.

13. An optical imaging apparatus for irradiating low-coherence light onto a subject and constructing a cross-section image of a subject, based on information from the light scattered at the subject, said optical imaging apparatus comprising:

an optical probe comprising;

a sheath formed of a flexible resin tube;

a flexible pipe member provided within said sheath

so as to be rotatable around the axis in the longitudinal direction;

a fiber formed of a single mode fiber provided within said flexible pipe member, such that the base portion and tip portion thereof are respectively fixed to the base and tip of said pipe member, so that light emitted from said low-coherence light source is cast into the base thereof;

a lens for converging light cast from said fiber provided to said fiber tip; and

an emission optical path changing means fixed to said lens, for changing the optical path of the emitted light;

a rotational driving device for providing rotational force to said pipe member of said optical probe;

an angle detecting means for detecting the rotational angle of said pipe member;

a scanning means which is connected to said optical probe and causes interference between said low-coherence light returning from the subject and reference light, and also scans said interference position in the axis direction regarding the optical axis, by changing propagation time;

a scanning timing detecting means for outputting the scanning timing of said scanning means;

an interference signal obtaining means for obtaining interference signals; and

an image configuring means for displaying interference

signal information on a display position, at a linear position extending from one fixed point in the image, corresponding with the rotational angle obtained by said angle detecting means at the time of detecting the scanning timing.

14. An optical imaging apparatus, comprising:

a recording means for recording interference signals obtained by scanning with a scanning means based on a scanning timing;

a function calculating means for calculating the relation between the scanning timing and rotational angle, obtained from the scanning timing and angle detecting means; and

an image configuring means for using said function calculating means to obtain information regarding the scanning timing corresponding to the predetermined rotation angle, obtaining recording information regarding interference signals based on the scanning timing information from said recording means, and displaying the information on a display device;

wherein said image configuring means changes the predetermined rotation angle, and displays the obtained interference signals as changes in brightness on the display device, at the position corresponding to the rotation angle.

15. An optical imaging apparatus according to Claim 14, wherein corresponding interference signals are generated by

interpointing with mathematical means, from recorded information corresponding to a plurality of scans, based on scanning timing information, and the information is displayed on a display device.

16. An optical imaging apparatus according to Claim 14, wherein said recording means comprises digital memory recording a plurality of pieces of one-dimensional information.

17. An optical imaging apparatus for irradiating low-coherence light onto a subject and constructing a cross-section image of a subject, based on information from the light scattered at the subject, said optical imaging apparatus comprising:

an optical probe comprising;

a sheath formed of a flexible resin tube;

a flexible pipe member provided within said sheath so as to be rotatable around the axis in the longitudinal direction;

a fiber formed of a single mode fiber provided within said flexible pipe member, such that the base portion and tip portion thereof are respectively fixed to the base and tip of said pipe member, so that light emitted from said low-coherence light source is cast into the base thereof;

a lens for converging light cast from said fiber

provided to said fiber tip; and

an emission optical path changing means fixed to said lens, for changing the optical path of the emitted light;

a rotational driving device for providing rotational force to said pipe member of said optical probe;

an angle detecting means for detecting the rotational angle of said pipe member;

a scanning means which is connected to said optical probe and causes interference between said low-coherence light returning from the subject and reference light, and also scans said interference position in the axis direction regarding the optical axis, by changing propagation time;

an interference signal obtaining means for obtaining interference signals; and

an image configuring means, which, in the event that the predetermined rotation angle is detected by the angle detecting means, changes the interference position with said scanning means, thereby obtaining interference signals changing the predetermined rotating angle, and displaying the obtained interference signals as changes in brightness on the display device, at the position corresponding to the rotation angle.

18. An optical scanning probe device for use in an optical imaging apparatus for irradiating low-coherence light onto a subject and constructing a cross-section image of a

subject, based on information from the light scattered at the subject, said optical scanning probe device comprising:

a sheath, the greater portion thereof being formed of a flexible resin tube with at least the tip thereof being formed of a material with good light transmittance; and

a light emission/incident light unit provided on the inner side of the portion of said sheath formed of a material with good light transmittance, for emitting light to the inner side of the sheath and irradiating the transmitted light onto the external subject, and for casting in and transmitting reflection/scattering/excitation light from the subject through the sheath;

wherein at least the portion provided with the light emission/incident light unit is exchangeable.

19. An optical scanning probe device according to Claim 18, wherein the tip of said sheath is not opened.

20. An optical scanning probe device according to Claim 18, which is capable of being inserted through a forceps channel of an endoscope.

21. An optical scanning probe device according to Claim 18, wherein a watertight seal comprised of an elastic member is provided at the connecting portion between said sheath and

said optical probe device proper.

22. An optical probe device for use in an optical imaging apparatus for irradiating low-coherence light onto a subject and constructing a cross-section image of a subject, based on information from the light scattered at the subject, said optical probe comprising:

a sheath, the greater portion of the overall length thereof being formed of a flexible resin tube with at least the tip thereof being formed of a material with good light transmittance;

a light emission/incident light unit provided on the inner side of the portion of said sheath formed of a material with good light transmittance, for emitting light to the inner side of the sheath and irradiating the transmitted light onto the external subject, and for casting in and transmitting reflection/scattering/excitation light from the subject through the sheath;

a flexible pipe member inserted generally over the entire length within the sheath;

a holding member for said light emission/incident light unit attached to the tip side of said flexible pipe member; and

a curved portion provided at the corner portion where said holding member comes into contact with the inner plane of the sheath.

23. An optical scanning probe device according to Claim 22, wherein said curved portion comprises a protective cap that is generally half-sphere shaped at the tip covering said light emission/incident light unit.

24. An optical scanning probe device according to Claim 23, comprising an optical window in said protective cap for said light emission/incident light unit.

25. An optical scanning probe device according to Claim 22, wherein said protective cap is provided with a hole for passage of a liquid sealed within said sheath.

26. An optical scanning probe device according to Claim 23, wherein said flexible pipe member comprises a coil shaft.

27. An optical scanning probe device according to Claim 26, wherein said coil shaft is a multiple coil of two or more layers.

28. An optical probe device for use in an optical imaging apparatus for irradiating low-coherence light onto a subject and constructing a cross-section image of a subject,

based on information from the light scattered at the subject, said optical scanning probe comprising:

a sheath, the greater portion of the overall length thereof being formed of a flexible resin tube with the tip thereof being formed of a material with good light transmittance, and at least the tip thereof not being opened;

a light emission/incident light unit provided on the inner side of the portion of said sheath formed of a material with good light transmittance, for emitting light to the inner side of the sheath and irradiating the transmitted light onto the external subject, and for casting in and transmitting returning light from the subject through said sheath;

a flexible pipe member inserted generally over the entire length within said sheath;

a holding member for said light emission/incident light unit attached to the tip side of said flexible pipe member;

an optical fiber provided in the hollow of said pipe member for transmitting low-coherence light; and

a seal for sealing liquid between the hollow in said sheath and the external diameter of the pipe member;

wherein a refractive index adjusting liquid is sealed in the hollow between at least said light emission/incident light unit and the inner side of said sheath.

29. An optical scanning probe device according to

Claim 28, provided with a seal at the base of said sheath, for sealing liquid between the inner hollow of said sheath and the periphery of said pipe member.

30. An optical scanning probe device according to Claim 29, wherein said seal is configured of an elastic member.

31. An optical scanning probe device according to Claim 29, wherein said pipe member is rotatable, and wherein the sealing functions are maintained regarding the rotation of said pipe member.

32. An optical scanning probe device according to Claim 28, provided with a filler hole at the base of said sheath, for sealing liquid between the inner hollow of said sheath and the periphery of said pipe member.

33. An optical scanning probe device according to Claim 28, provided with a seal at the base of said pipe member, for sealing liquid between the inner hollow of said pipe member and said optical fiber.

34. An optical scanning probe device according to Claim 28, wherein said refractive index adjusting liquid is water.

35. An optical scanning probe device according to Claim 28, wherein said light emission/incident light unit has a lens for converging light from optical fiber and a prism for bending the direction of the optical axis at a generally right angle.

36. An optical scanning probe device according to Claim 35, wherein the gap between said optical fiber end and said lens is filled with an optical material.

37. An optical scanning probe device according to Claim 35, comprising reflective coating on the reflective plane of said prism.

38. An optical probe device for use in an optical imaging apparatus for irradiating low-coherence light onto a subject and constructing a cross-section image of a subject, based on information from the light scattered at the subject, said optical probe comprising:

a sheath, the greater portion thereof being formed of a flexible resin tube with at least the tip thereof being formed of a material with good light transmittance;

a light emission/incident light unit provided on the inner side of the portion of said sheath formed of a material with good

light transmittance, for emitting light toward the inner side of said sheath, irradiating the transmitted light onto the external subject, and casting in and transmitting returning light from the subject through said sheath, said light emission/incident light unit comprising a tip optical member, having;

a lens for converging light from optical fiber; and

a prism for bending the direction of the optical axis at a generally right angle;

a flexible pipe member inserted generally over the entire length within said sheath;

an optical fiber provided within the inner hollow of said pipe member, for transmitting low-coherence light;

a fiber holding member for holding the edge of said optical fiber; and

a connecting member for connecting the tip of said flexible pipe member and said fiber holding member and said tip optical member;

wherein the connection portion between said flexible pipe member and said connecting member exist within the range of the length of said fiber holding member.

39. An optical scanning probe device according to Claim 38, wherein said fiber holding member is a cylindrical

member through which at least the core of said optical fiber has been passed, having an external diameter smaller than the inner diameter of said flexible pipe member for at least a part of the entire length thereof.

40. An optical scanning probe device according to Claim 39, wherein said fiber holding member is a pipe member through which the core and covering of said optical fiber have been passed at the same time, having an external diameter smaller than the inner diameter of said flexible pipe member.

41. An optical scanning probe device according to Claim 38, wherein said connection member has an internal diameter greater than the external diameter of said flexible pipe member for at least a part thereof, with the tip of said flexible pipe member being connected to said internal diameter portion.

42. An optical imaging apparatus for irradiating low-coherence light onto a subject and constructing a cross-section image of a subject, based on information from the light scattered at the subject, said optical imaging apparatus comprising:

an optical probe unit having a replaceable optical connector unit which has built therein a single mode fiber for transmitting low-coherence light to the subject;

a first propagation time changing means connected to said optical probe unit, causing interference between said low-coherence light returning from the subject and reference light, and also changing propagation time in order to scan said interference position in the axis direction regarding the optical axis, according to the scanning range;

detecting means for detecting the change in the optical coefficients of the tip optical member of said optical probe unit, and detecting the length of the optical path thereof;

calculating means for calculating the length of the optical path of the optical probe unit from the change in optical coefficients and the length of the optical path thereof; and

a second propagation time changing means for changing propagation time according to the calculated optical path length of the optical probe unit.

43. An optical imaging apparatus according to Claim 42, wherein said detecting means changes the propagation time by at least one of the first or second propagation time changing means, thereby causing interference between said low-coherence light returning from the optical member within said optical probe and reference light, and scanning said interference position in the axis direction regarding the optical axis, thereby detecting the interference intensity and interference position.

44. An optical imaging apparatus according to Claim 42, wherein changes in the optical coefficients consist of reflection intensities at the surface of the optical element.

45. An optical imaging apparatus according to Claim 44, wherein the tip portion of said optical probe unit has optical fiber and a lens for converging light from said optical fiber and a prism for bending the direction of the optical axis in a generally right angle, and wherein said calculating means calculates the length of the optical path of the optical probe unit, from at least one of the optical fiber end, lens surface, and prism plane reflection intensity peak.

46. An optical imaging apparatus according to Claim 44, wherein said optical probe unit has a sheath, the greater portion of the overall length thereof being formed of a flexible resin tube with at least the tip thereof being formed of a material with good light transmittance, and wherein said calculating means calculates the length of the optical path of said optical probe unit according to the reflection intensity peak at the outer surface or inner surface of said sheath.

47. An optical imaging apparatus according to Claim 44, wherein the position of an optical element is determined by the reflection intensity and reflection intervals of each plane

of said optical element, thereby calculating the length of the optical path of said optical probe unit.

48. An optical imaging apparatus arranged such that low-coherence light emitted from a light source with a short coherence length is divided into a signal light side and a reference light side, and following irradiation of said signal light to the object of observation, said signal light and reference light are synthesized again to comprise an interferometer, so that in the event of obtaining interference signals, the length of the optical path of a variable-length optical path optical system provided to said reference light side or said signal light side is changed, thereby enabling observation of a cross-section structure of the observed image, wherein said variable-length optical path optical system changes the length of the optical path by changing the refraction angle of an optical element provided on the optical path.

49. An optical imaging apparatus according to Claim 48, wherein said variable-length optical path optical system comprises a parallel plate prism, and wherein the length of the optical path is changed by rotating said parallel plate prism.

50. An optical imaging apparatus according to Claim 48, wherein said variable-length optical path optical system

comprises a parallel plate prism, and wherein the length of the optical path is changed by oscillating said parallel plate prism.

51. An optical imaging apparatus according to Claim 48, said variable-length optical path optical system comprising:

a guiding single mode optical fiber for guiding light to said variable-length optical path optical system;

a collimator lens for collimating light from said guiding single mode optical fiber;

a converging lens for converging generally parallel light rays;

an extracting single mode optical fiber for extracting light; and

an optical element having mutually parallel planes;

wherein the optical system is arranged such that light passing through said variable-length optical path optical system passes through at least said optical element having mutually parallel planes, and said optical element having mutually parallel planes is rotated or oscillated, thereby changing the length of the optical path between said guiding single mode optical fiber and said extracting single mode optical fiber.

52. An optical imaging apparatus according to Claim 51, wherein light passing through said variable-length optical path optical system passes through said optical element having

mutually parallel planes an even number of times.

53. An optical imaging apparatus according to Claim 52, wherein said variable-length optical path optical system is comprised in the order of:

a single mode optical fiber serving both as said guiding single mode optical fiber and said extracting single mode optical fiber;

a positive lens serving as both said collimator lens and said converging lens;

said optical element having mutually parallel planes; and

an optical element for reflecting the light in the direction from whence it came;

wherein rotating or oscillating said optical element having mutually parallel planes changes the length of the optical path of the light emerging from said single mode optical fiber and returning to said single mode optical fiber again.

54. An optical imaging apparatus according to Claim 52, wherein said variable-length optical path optical system is comprised of:

a single mode optical fiber serving both as said guiding single mode optical fiber and said extracting single mode optical fiber;

a positive lens serving as both said collimator lens and

said converging lens;

said optical element having mutually parallel planes;

an optical element for reflecting the light in the direction from whence it came; and

at least one optical path deviating element for offsetting the position of incident light in a parallel direction or opposite direction, and emitting the light;

wherein rotating or oscillating said optical element having mutually parallel planes changes the length of the optical path of the light emerging from said single mode optical fiber and returning to said single mode optical fiber again.

55. An optical imaging apparatus according to Claim 52, wherein said variable-length optical path optical system is comprised of:

a guiding single mode optical fiber for guiding light to said variable-length optical path optical system;

a collimator lens;

at least one variable-length optical path optical element group;

a converging lens; and

an extracting single mode optical fiber for extracting light;

said variable-length optical path optical element group comprising;

a first optical element having mutually parallel planes; and

a second optical element, having mutually parallel planes, and formed of a member which has the same refractive index as said first optical element and wherein the spacing between the parallel planes is the same;

wherein the mutually parallel planes of said first optical element within said variable-length optical path optical element group and said second optical element therein are rotated or oscillated in opposing directions at the same angle, thereby changing the length of the optical path between said guiding single mode optical fiber and said extracting single mode optical fiber.

56. An optical imaging apparatus according to Claim 52, wherein said variable-length optical path optical system is comprised of:

a guiding single mode optical fiber for guiding light to said variable-length optical path optical system;

a collimator lens;

a converging lens;

an extracting single mode optical fiber for extracting light from said variable-length optical path system;

an optical element having mutually parallel planes; and

at least one optical path deviating element for offsetting

the position of incident light in a parallel direction or opposite direction, and emitting the light;

wherein rotating or oscillating said optical element having mutually parallel planes changes the length of the optical path of the light emerging from said guiding single mode optical fiber and returning to said extracting single mode optical fiber again.

57. An optical imaging apparatus according to Claim 52, wherein said variable-length optical path optical system is comprised of:

a guiding single mode optical fiber for guiding light to said variable-length optical path optical system;

a collimator lens;

a converging lens;

an extracting single mode optical fiber for extracting light from said variable-length optical path optical element system;

at least one optical element group; and

at least one optical path deviating element for offsetting the position of incident light in a parallel direction or opposite direction, and emitting the light;

said variable-length optical path optical element system comprising;

a first optical element having mutually parallel

planes; and

a second optical element, having mutually parallel planes, and formed of a member which has the same refractive index as said first optical element and wherein the spacing between the parallel planes is the same;

wherein the mutually parallel planes of said first optical element within said optical element group and said second optical element therein are rotated or oscillated in opposing directions at the same angle, thereby changing the length of the optical path between said guiding single mode optical fiber and said extracting single mode optical fiber.

58. An optical imaging apparatus according to Claim 54, wherein said optical path deviating element comprises a roof mirror having planes with mutually right angles.

59. An optical imaging apparatus according to Claim 54, wherein said optical path deviating element comprises a right-angle prism.

60. An optical imaging apparatus according to Claim 58, said optical path deviating element comprising:

a single mode optical fiber for optical path deviation;

a converging lens for optical path deviating elements, for converging light to said a single mode optical fiber for

optical path deviation; and

a collimator lens for optical path deviating elements, for making the light emitted from said single mode optical fiber for optical path deviation to be generally parallel;

wherein the incident end plane of said single mode optical fiber for optical path deviation and the emitting end plane thereof are arrayed in a parallel manner.

61. An optical imaging apparatus according to Claim 56, wherein said optical path deviating element comprises a roof mirror having planes with mutually right angles.

62. An optical imaging apparatus according to Claim 56, wherein said optical path deviating element comprises a right-angle prism.

63. An optical imaging apparatus according to Claim 57, wherein said optical path deviating element comprises a roof mirror having planes with mutually right angles.

64. An optical imaging apparatus according to Claim 57, wherein said optical path deviating element comprises a right-angle prism.

65. An optical imaging apparatus according to Claim

52, wherein said optical element having mutually parallel planes is of a polygon shape.

66. An optical imaging apparatus according to Claim 48, said variable-length optical path optical system comprising:

a guiding single mode optical fiber for guiding light to said variable-length optical path optical system;

a collimator lens for collimating light from said guiding single mode optical fiber;

a converging lens for converging generally parallel light;

an extracting single mode optical fiber for extracting light; and

an optical element having flat planes;

wherein said optical element having flat planes is rotated or oscillated, thereby changing the length of the optical path between said guiding single mode optical fiber and said extracting single mode optical fiber.

67. An optical imaging apparatus according to Claim 48, wherein said variable-length optical path optical system comprises a liquid crystal member positioned in an inclined manner as to incident light, and wherein the length of the optical path is changed by changing the refractive index of the liquid crystal of said liquid crystal member.

68. An optical imaging apparatus arranged such that low-coherence light emitted from a light source with a short coherence length is divided into a signal light side and a reference light side, and following irradiation of said signal light to the object of observation, said signal light and reference light are synthesized again to comprise an interferometer, so that in the event of obtaining interference signals, the length of the optical path of a variable-length optical path optical system provided to said reference light side or said signal light side is changed, thereby enabling observation of a cross-section structure of the observed image, said variable-length optical path optical system comprising:

a guiding single mode optical fiber for guiding light to said variable-length optical path optical system;

a collimator lens for collimating light from said guiding single mode optical fiber;

a converging lens for converging generally parallel light rays;

an extracting single mode optical fiber for extracting light; and

an optical element having flat planes;

said optical element having flat planes comprising a liquid crystal device positioned in an inclined manner as to incident light, and wherein the length of the optical path is

changed by changing the refractive index of said liquid crystal device.